H 5228 US
11.06.2001

WHAT IS CLAIMED IS:

1. A method for illuminating an object comprising the following steps:

-generating a light beam with a laser,

- injecting the light beam into a microstructured optical element which spectrally broadens the light of the light beam,

- shaping the spectrally broadened light beam to form an illumination light beam, and

- directing the illumination light beam onto the object.

2. Method according to Claim 1, further comprising the step:

- selecting at least one wavelength range from the spectrally broadened light and directing the light of the selected wavelength range onto the object.

3. Method according to Claim 1, further comprising the step:

- adjusting the power of the spectrally broadened light.

4. Method according to Claim 1, further comprising the step:

- adjusting the spectral composition of the spectrally broadened light.

5. Method according to Claim 1, further comprising the step:

- adjusting the polarization of the spectrally broadened light.

6. Method according to Claim 1, wherein the light beam is generated by a plurality of light pulses, wherein the light pulses have a pulse width and a chirp.

7. Method according to Claim 6, further comprising the step:

- adjusting the pulse width of the light pulses.

8. Method according to Claim 6, further comprising the step:

- adjusting the chirp of the light pulses.

9. An illuminating instrument comprising: a laser that emits a light beam, a microstructured optical element that spectrally broadens the light from the laser and a first optical means for shaping the spectrally broadened light into an illumination light beam.

10. Illuminating instrument according to Claim 9, further comprising an instrument for varying the power of the spectrally broadened light.

11. Illuminating instrument according to Claim 9, further comprising ~~an~~ instrument for varying the power of a portion of at least one wavelength of the ~~of~~ the ~~spectrally~~ broadened light.

12. Illuminating instrument according to Claim 9, further comprising a second optical means for focussing the light beam from the laser onto the microstructured optical element.

13. Illuminating instrument according to Claim 9, wherein the microstructured optical element contains a plurality of micro-optical structure elements, which have at least two different optical densities.

14. Illuminating instrument according to Claim 9, wherein the microstructured optical element comprises a first region having a homogeneous structure and a second region formed by micro-optical structure elements.

15. Illuminating instrument according to Claim 9, wherein the first region encloses the second region.

16. Illuminating instrument according to Claim 9, wherein the microstructured optical element consists essentially of adjacent glass, plastic material, cavities, cannulas, webs, honeycombs or tubes.

17. Illuminating instrument according to Claim 9, wherein the microstructured optical element consists of photonic band gap material.

18. Illuminating instrument according to Claim 9, wherein the microstructured optical element is configured as an optical fibre.

19. Illuminating instrument according to Claim 9, wherein the microstructured optical element is configured as a tapered optical fibre.

20. A device for a microscopic inspection comprising: a laser that emits a light beam, a microstructured optical element that spectrally broadens the light from the laser and an optical means for shaping the spectrally broadened light into an illumination light beam.

21. Device according to Claim 20, wherein the microstructured optical element consists of photonic band gap material.

22. Device according to Claim 21, wherein the microstructured optical element is configured as a tapered optical fibre.

23. Device according to Claim 21, wherein the device consists essentially of a confocal scanning microscope, a flow cytometer, an endoscope, a chromatograph or a lithography instrument.